Project Title: Develop instructions for elevators and escalators motor-drive system technical characteristics

Department:	High efficient induction electric motors and drives plan	***Employer:***	NRI
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Keywords:

Energy consumption in elevator and escalator, energy consumption decrease, electric motor and drive, technical specification instruction. Energy consumption standard, gearbox motors and gearless motors.

Project Necessity:

Due to the high cost of energy production and environmental issues, industrial countries have been decided to manage the energy consumption in the last decades. One aspect of energy management is to use high efficiency equipment.

Elevators and escalators consume high volume of produced energy. To manage the energy consumption in this sector, the components should be investigated and components with the most efficiency should be selected. Understanding the existed systems and performing energy management in this sector can lead to decrease in energy consumption.

Project Goals:

The goal of these instructions are providing a set of definitions, explanations and rules for:

- Increasing the motor-drive system efficiency in both elevator and ascalator applications
- Increasing the electromagnetic compatitbility of the motor-drive system efficiency in both elevator and ascalator applications

About this instruction, it is important to observe these points:

1. Any local instructions related to the mandatory instruction, must not violate that.

2. The reference for resolve any ambiguity in this instruction is a committee of governmental and non-governmental organs.

3. There is no possibility of any Correction and scratching in this instruction and in case of any contradiction within the instructin's parts with the administrative principles or in case of any ambiguity, the case must be informed to the instruction leadership committee.

4. The instruction leadership committee must set periodical meetings and evaluate the executive results of the instruction and revision if necessary.

The final production is an instruction including these items with addressing related standards:

Technical specification of motor and drive according to elevators and escalators power range, voltage range, IE and IES classes, protection functions, power quality requirements (harmonics, EMC and power factor), the type of control systems, Environmental conditions.

Abstract:

The instruction of "elevators and escalators motor-drive system technical characteristics" focuses on the elevators and escalator energy consumption related to the motor and drive efficiency and electromagnetic compatibility and effort for providing an appropriate and operational structure.

The instruction focuses on the standard EN 12015, ISO 25745 and EN 12016. Also it provides a schedule to pass from the present level to an upper level.

The process of the developing of the instruction has started since 1397 as follow:

Phase	Schedule	Man hour	The output
1	Favardin to Khordad 97	24,288	The investigation of motor and drive products in Iran and other countries and proving the standards
2	Tir to Esfand 97 Aban to Azar 98	193,375	1. Investigation of the history of the elevators and escalators 2. Review of the structures 3. Investigation of the energy consumption of the elevators 4. Investigation of the appropriate technology
3	Dey 98 to Khordad 99	90,675	1. Development of the draft 2. Holding the meetings with experts and government men
4	Khordad to Mehr 99	11,299	Holding the final seminar

Finally by holding the meetings with experts and government men, the needed data for the instruction has been gathered. The organs involved in these meetings are:

- Iran national standards organization
- Tehran standard organization
- Tehran construction engineering organization
- Iranian elevator and escalator union

- The center of test, investigation and energy standards Abaniroo
- Renewable energy and energy efficiency organization
- Demand management office of Tavanir

In order to provide an appropriate infrastructure for developing the draft, with refer to guidelines, directives, regulations, standards, manuals, catalogs and technical reports, the present situation of the elevator and escalator industry was studied.

Row	Document	Source
1	Energy Efficient Elevators & escalator	University of Coimbra (Portugal), Intelligent Energy Europe, European Commission
2	the Advantage of PMSM Technology in High Rise Building	Kone Company
3	Guidelines on Energy Efficiency of Lift & Escalator Installations	Government of the Hong Kong
4	Improving Your Power Factor	Yaskawa Company
5	Induction Motor Versus Permanent Magnet Synchronous Motor in Motion Control Applications: a Comparative Study	Lappeenranta University of Technology
6	Geared VS Gearless Energy Efficiency Comparison	SASSI Lift Systems (Alerto Sassi)
7	ENERGY STAR Escalators Discussion Guide	ENERGY STAR Program (EPA & U.S. Department of ENERGY)
8	Planning Guide for Escalators and Moving Walks	Schindler Company

Steps and Methodologies:

In the phase 1, products of Iranian and foreign manufactures in the sector of electric drive, electric motor and other related electrical, electronical and mechanical components in the Iran elevator and escalator market were investigated and products table considering power, efficiency and power factor was completed. During investigations, Parstronic consulted with producers and all stakeholders in this sector and held several meetings with them.

In the beginning of phase 2, history, construction, energy consumption and types of elevators and escalators were investigated. After that, the international standards related to the elevators and escalators were identified and the initial list of standards were completed. In the next step, standards were classified and investigated.

In the phase 3, in order to codifying instruction with the purpose of reducing energy consumption, increasing power factor and increasing electromagnetic compatibility of elevators and escalators, important parameters investigated and based on them the instruction was prepared.

In the final phase of project, the instruction was notified to the stakeholders and based on their opinions, the instruction was edited and the final version of instruction was prepared.

Main Results (technical outputs, patents, papers, books, reports, etc.):

- The instruction of "elevators and escalators motor-drive system technical characteristics"
- The project report